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# SAI RAM ENGINEERING COLLEGE

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## 24BSCY101 - ENGINEERING CHEMISTRY QUESTION BANK

### MODULE - 5 FUELS

S. No.	Questions	Marks	K Level	CO's
	<b>PART - A</b>			
1	<b>What is the calorific value of a fuel?</b> A. The volume of air required for complete combustion of the fuel. <b>B. The amount of heat produced on burning 1 gram of fuel.</b> C. The amount of carbon dioxide produced during combustion. D. The time taken for the fuel to combust.	1	K1	CO5
2	<b>Which type of coal has the highest carbon content?</b> A. Lignite B. Bituminous <b>C. Anthracite</b> D. Peat	1	K1	CO5
3	<b>The minimum temperature at which a substance catches fire is called its:</b> A. Combustion point B. Boiling point <b>C. Ignition temperature</b> D. Melting point	1	K1	CO5
4	<b>Which of the following is a solid fossil fuel?</b> A. Methane B. Petroleum <b>C. Coal</b> D. LPG	1	K1	CO5
5	<b>Which of the following is a characteristic of a good fuel?</b> A. High ignition temperature B. Low calorific value <b>C. Low moisture content</b> D. High residue after combustion	1	K1	CO5
6	<b>Which of the following is considered a renewable fuel?</b> A. Natural gas B. Coal	1	K1	CO5



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	<b>C. Biomass</b> D. Diesel			
7	<b>Which of the following fuels has the highest calorific value?</b> <b>A. Hydrogen</b> B. Coal C. Diesel D. Petrol	1	K1	CO5
8	<b>In the process of combustion, what is the role of oxygen?</b> A. To increase the temperature of the system. <b>B. To act as a reactant and support combustion.</b> C. To decrease the ignition point of the fuel. D. To prevent the formation of pollutants.	1	K1	CO5
9	<b>Producer gas is a mixture of:</b> A. Carbon monoxide and hydrogen B. Carbon dioxide and hydrogen <b>C. Carbon monoxide and nitrogen</b> D. Methane and hydrogen	1	K1	CO5
10	<b>Producer gas is a mixture of:</b> <b>A. Carbon monoxide and hydrogen</b> B. Carbon dioxide and hydrogen C. Carbon monoxide and nitrogen D. Methane and hydrogen	1	K1	CO5
11	<b>Knocking in engines is caused by:</b> A. Low pressure in the cylinder. B. High octane rating of the fuel. <b>C. Premature combustion of fuel-air mixture.</b> D. Incomplete combustion of the fuel.	1	K1	CO5
12	<b>Knocking of gasoline is reduced by using</b> A. Butane B. Octane C. Hydrocarbon <b>D. Tetra Ethyl Lead</b>	1	K1	CO5
13	<b>What is the main component of natural gas?</b> A. Ethane <b>B. Methane</b>	1	K1	CO5



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	C. Propane D. Butane			
14	<b>Which pollutant is mainly released during the incomplete combustion of fossil fuels?</b> A. Carbon dioxide <b>B. Carbon monoxide</b> C. Sulfur dioxide D. Nitrogen oxides	1	K1	CO5
15	<b>The octane number of a fuel is a measure of:</b> A. The calorific value of the fuel. B. The amount of carbon present in the fuel. <b>C. The knocking characteristics of the fuel.</b> D. The efficiency of the fuel in a diesel engine.	1	K1	CO5
16	<b>Which of the following is NOT a gaseous fuel?</b> A. Biogas B. LPG C. CNG <b>D. Kerosene</b>	1	K1	CO5
17	<b>What is the major by-product of combustion in a limited supply of air?</b> A. Carbon dioxide <b>B. Carbon monoxide</b> C. Water vapor D. Sulfur dioxide	1	K1	CO5
18	<b>The process of removing moisture and volatile substances from coal by heating it in the absence of air is called:</b> <b>A. Carbonization</b> B. Combustion C. Gasification D. Cracking	1	K1	CO5
19	<b>In the combustion of hydrocarbons, which two main products are formed?</b> <b>A. Carbon dioxide and water</b> B. Carbon monoxide and water C. Nitrogen dioxide and sulfur dioxide D. Methane and water vapor	1	K1	CO5



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20	<b>What is the function of excess air in combustion?</b> A. To increase the efficiency of the combustion process. B. To cool down the combustion chamber. <b>C. To ensure complete combustion.</b> D. To reduce the formation of nitrogen oxides.	1	K1	CO5
21	<b>23. LPG (Liquefied Petroleum Gas) mainly contains:</b> A. Methane and hydrogen <b>B. Propane and butane</b> C. Ethanol and methanol D. Carbon monoxide and oxygen	1	K1	CO5
22	<b>Bio-diesel is manufactured by the reaction between</b> A. Glycerol and Methanol <b>B. Triglyceride and Methanol</b> C. Methyl ester of fatty acids D. Glycol and Ethanol	1	K1	CO5
23	<b>The process of heating coal in the absence of air to produce coke is known as:</b> A. Gasification <b>B. Carbonization</b> C. Liquefaction D. Cracking	1	K1	CO5
24	<b>What is the major pollutant emitted by the combustion of diesel?</b> A. Nitrogen oxides B. Sulfur dioxide C. Methane D. Carbon dioxide	1	K1	CO5
25	<b>Latent heat of steam is</b> A. 2240 cal / g B. 8080 cal / g <b>C. 587 cal / g</b> D. 34500 cal / g	1	K1	CO5
	<b>PART - B</b>			
1	List out the requirements of a good fuel.	2	K1	CO5
2	Distinguish between proximate and ultimate analysis.	2	K1	CO5
3	Why is coke superior as a metallurgical fuel?	2	K1	CO5



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4	What is the drawback of the presence of sulphur in coal?	2	K1	CO5
5	Distinguish between coal and coke.	2	K1	CO5
6	What is caking coal and coking coal?	2	K1	CO5
7	What is knocking?	2	K1	CO5
8	How can we improve the anti-knocking property of a fuel?	2	K1	CO5
9	Define Octane number	2	K1	CO5
10	Define Cetane number.	2	K1	CO5
11	Why should leaded petrol not be used?	2	K1	CO5
12.	List out the advantages of CNG over LPG.	2	K1	CO5
13	Mention any two disadvantages of LPG over other gaseous fuels.	2	K1	CO5
14	Write the characteristics of a good fuel.	2	K1	CO5
15	How do you prepare the biodiesel?	2	K1	CO5
16	What are the disadvantages of biodiesel?	2	K1	CO5
17	Define calorific value?	2	K1	CO5
18	Define NCV.	2	K1	CO5
19	Define GCV.	2	K1	CO5
20	What is Dulong's Formula?	2	K1	CO5
	<b>PART-C</b>			
1	Explain the proximate analysis of coal. Write its significance.	10	K2	CO5
2.	Explain the ultimate analysis of coal.	10	K2	CO5
3	Describe the Otto – Hoffman coke manufacture and the recovery of various by-products.	10	K2	CO5
4	Explain flue gas analysis by ORSAT method with suitable diagrams.	10	K2	CO5
5	What is synthetic petrol? How is it manufactured by the Bergius process?	10	K2	CO5



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6	Write a short note on Leaded petrol.	05	K2	CO5
7	Differentiate between gasoline and diesel.	05	K2	CO5
8	Write notes on: a. Gobar gas b. Bio-diesel.	10	K2	CO5
9	Describe the fractional distillation of petroleum in detail.	10	K2	CO5
10	Calculate Gross and Net calorific value of coal having the following compositions. Carbon-85%, Hydrogen-8%, Sulphur-1%, Nitrogen-2% and Ash-4%.	07	K3	CO5

## MODULE-6 NANO CHEMISTRY

S. No.	Questions	Marks	K Level	CO's
	<b>PART - A</b>			
1	<b>What is the typical size range of nanoparticles?</b> A. 1–10 nanometers <b>B. 1–100 nanometers</b> C. 1–1000 nanometers D. 10–1000 nanometers	1	K1	CO6
	<b>What is nanochemistry?</b> a) Study of large-scale materials b) Study of atomic and molecular structures with nanoscale dimensions c) Study of macroscopic chemical reactions d) Study of polymers only			
2	<b>Which property is NOT typically size-dependent for nanoparticles?</b> A. Melting point B. Surface area to volume ratio C. Electrical conductivity <b>D. Atomic mass</b>	1	K1	CO6



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3	<p><b>Which of the following methods is used for synthesizing nanoparticles by breaking larger particles?</b></p> <p>A. Sol-gel method <b>B. Ball milling</b> C. Vapor deposition D. Chemical reduction</p>	1	K1	CO6
4	<p><b>What is the primary reason nanoparticles have unique properties?</b></p> <p><b>A. Large surface area to volume ratio</b> B. Low density C. High atomic mass D. Crystalline structure</p>	1	K1	CO6
5	<p><b>The optical properties of gold nanoparticles depend on their:</b></p> <p>A. Size and shape B. Temperature and pressure C. Chemical composition only D. Electrical conductivity</p>	1	K1	CO6
6	<p><b>Which of the following techniques is used to analyze the size of nanoparticles?</b></p> <p>A. X-ray diffraction (XRD) <b>B. Transmission electron microscopy (TEM)</b> C. Fourier-transform infrared spectroscopy (FTIR) D. UV-visible spectroscopy</p>	1	K1	CO6
7	<p><b>Carbon nanotubes (CNTs) are primarily made of which type of carbon structure?</b></p> <p>A. Graphene B. Diamond C. Fullerenes D. Amorphous carbon</p>	1	K1	CO6
8	<p><b>Quantum dots are used in which of the following applications?</b></p> <p>A. Solar cells B. Biological imaging C. LED displays <b>D. All of the above</b></p>	1	K1	CO6



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9	<b>Which of the following is a bottom-up approach to nanomaterial synthesis?</b> A. Chemical vapor deposition B. Ball milling C. Mechanical grinding D. Laser ablation	1	K1	CO6
10	<b>What is a nanocomposite?</b> A. A composite material made of fibers only. <b>B. A material combining nanoparticles with a bulk matrix.</b> C. A composite made entirely of metals. D. A material that exists only in the nano range.	1	K1	CO6
11	<b>What is the role of surfactants in nanoparticle synthesis?</b> A. To stabilize nanoparticles and prevent aggregation. B. To increase the size of nanoparticles. C. To reduce the electrical conductivity of nanoparticles. D. To accelerate the reaction time.	1	K1	CO6
12	<b>Which of the following is NOT an application of nanotechnology?</b> A. Drug delivery B. High-performance concrete <b>C. DNA replication</b> D. Catalysis	1	K1	CO6
13	Which of the following is an application of nanotechnology? A. Drug delivery systems B. Food preservation C. Environmental remediation <b>D. All of the above</b>	1	K1	CO6
14	<b>What is graphene?</b> A. A single layer of carbon atoms arranged in a 2D honeycomb lattice. B. A 3D arrangement of carbon nanotubes. C. A spherical carbon molecule. D. A polymer of carbon and hydrogen.	1	K1	CO6
15	<b>What is the primary advantage of using nanoparticles in medicine?</b> A. They are non-toxic at all sizes. <b>B. They can deliver drugs directly to target sites.</b>	1	K1	CO6



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	C. They are cheap to produce. D. They eliminate the need for other medical treatments.			
16	<b>Which of the following is a common challenge in nanotechnology?</b> <b>A. Difficulty in controlling nanoparticle size and shape.</b> B. Lack of applications for nanoparticles. C. Overproduction of nanoparticles. D. Uniform electrical properties in all nanoparticles.	1	K1	CO6
17	<b>The primary building block of fullerenes is:</b> <b>A. Spherical carbon structures.</b> B. Graphite sheets. C. A single-layered honeycomb carbon network. D. Diamond-like structures.	1	K1	CO6
18	<b>Which property makes titanium dioxide nanoparticles useful in sunscreen?</b> <b>B. Transparency to visible light but absorption of UV radiation</b> A. High electrical conductivity C. Magnetic properties D. Catalytic activity	1	K1	CO6
19	<b>Which of the following structure present in the CNT?</b> <b>D. All the above</b> A. Arm-chair B. Zig-zag C. Chiral	1	K1	CO6
20	<b>Which of the following nanoparticle used in targeted drug delivery applications?</b> <b>D. Au</b> A. Ag B. Pt C. Cu	1	K1	CO6
21	<b>Which of the following nanoparticles is widely used in magnetic storage devices?</b> <b>B. Iron oxide nanoparticles</b> A. Gold nanoparticles C. Silver nanoparticles D. Titanium dioxide nanoparticles	1	K1	CO6
22	<b>Nanomaterials are often used in water treatment because of their:</b>	1	K1	CO6



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	A. Magnetic properties <b>B. High adsorption capacity</b> C. Electrical conductivity D. Transparent nature			
23	<b>Which type of bonding dominates in nanoparticles?</b> A. Covalent bonding B. Ionic bonding C. Metallic bonding <b>D. Surface bonding and van der Waals forces</b>	1	K1	CO6
24	<b>Titanium dioxide nanoparticles are commonly used in:</b> A. Food coloring <b>B. Solar cells and sunscreens</b> C. Magnetic storage devices D. Electrical insulators	1	K1	CO6
25	<b>Which of these nanomaterials is known for its antibacterial properties?</b> A. Gold nanoparticles <b>B. Silver nanoparticles</b> C. Carbon nanotubes D. Graphene oxide	1	K1	CO6
<b>PART - B</b>				
1	What are nanoparticles?	2	K1	CO6
2	What are nanomaterials?	2	K1	CO6
3	What is Nanoscience?	2	K1	CO6
4	What is the top-down method?	2	K1	CO6
5	What are carbon nanotubes?	2	K1	CO6
6	Give some methods to synthesize CNT.	2	K1	CO6
7	What is nano-rod?	2	K1	CO6
8	What are nano clusters?	2	K2	CO6
9	Define nano-wires.	2	K2	CO6



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10	What is quantum dots?	2	K2	CO6
11	Mention some characteristic properties of nanomaterials.	2	K1	CO6
12	Distinguish between bulk particles and nano-particles.	2	K1	CO6
13	What are magic numbers?	2	K1	CO6
14	Discuss any four salient properties of nanomaterials.	2	K1	CO6
15	What are the properties of CNT?	2	K1	CO6
<b>PART - C</b>				
1	Explain the top-down and bottom-up method of synthesizing nanomaterials.	05	K2	CO6
2	Write any four methods of preparation of nanoparticles?	10	K2	CO6
3	Discuss the CVD and Laser ablation techniques for the synthesis of nanoparticles.	10	K2	CO6
4	Discuss the synthesis of nanomaterials by precipitation and thermolysis method.	05	K2	CO6
5	Discuss the CVD and electrodeposition techniques for the synthesis of nanoparticles.	10	K2	CO6
6	Describe the hydrothermal and electrodeposition techniques for the synthesis of nanoparticles.	10	K2	CO6
7	Discuss the types of carbon nanotubes and their applications.	10	K2	CO6
8	Describe any two methods of synthesizing nanomaterials.	10	K2	CO6
9	How are carbon nanotubes synthesized? What are its applications?	10	K2	CO6
10	Explain the role of nanoparticle in medicine.	10	K2	CO6
11	What are the applications of Nanomaterials?	10	K2	CO6



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12	Discuss the properties and application of CNT's.	10	K2	CO6
13	Discuss the structural feature of CNT's and write its applications.	10	K2	CO6
14	Write an informative note on the properties and application of nanoparticles.	10	K2	CO6
15	Explain the concept, properties and application of quantum dots.	10	K2	CO6